

Notes on the Pteridophytes of the north shore of Lake Superior

O. E. JENNINGS

It was with feelings of great expectation that the writer stepped out upon the deck of the "Assiniboia" early in the morning of June 17, 1912. The steamer was bound westward and through the cold driving rain and fog could be gotten occasional glimpses of Pie Island to the left and, close by on the right, the towering form of the Sleeping Giant—the Gibraltar that guards the entrance to Thunder Bay in the northwestern part of Lake Superior.

Arrived at Fort William, a thriving port on the western shore of Thunder Bay, about twenty miles across from the Sleeping Giant, my friend, Mr. R. H. Daily, and I soon established our headquarters in a small hotel and early in the afternoon started out for Mount McKay, a rather flat-topped, but precipitous mountain rising to a height of about one thousand feet above the level of Lake Superior and situated about four miles south of the town.

Thus began a delightful, and at times rather exciting, collecting trip of three months in the region extending along the north shore of Lake Superior from the vicinity of Fort William in the west to Heron Bay in the east, a range of about two hundred miles. The main stops were made at Fort William, Nepigon, Rossport, Jackfish, and Heron Bay, all on the main line of the Canadian Pacific, while other stops were made on Thunder Cape and St. Ignace Island, out in the Lake, and excursions penetrated the interior as far as Kakabeka Falls about twenty miles west of Fort William and Lake Jessie about twenty

miles north of Nepigon. Mr. Daily remained with the writer until the first week in September and was of great assistance in many ways, although not officially posing as a collector. Mrs. Jennings joined us about the first of August and was of great assistance in the work, as from that time on until the end of the season the weather was one continual round of cold drifting rains and fogs which made the preparation of suitable collections very difficult.

The general features of the region covered in this work are quite diversified—rounded rocky hills and knolls, steep cliffs, well-developed talus-slopes, fiord-like inlets, great and numerous bogs and lakes, and cold swift-running streams. At Fort William is an extensive alluvium-filled valley elevated but a few feet above the level of Lake Superior and through which the Kaministiquia River empties in the form of a branching delta. All along the North Shore are areas of sand and gravel terraces which have been formed when the lake was at various higher levels. Remains of at least five such terraces arranged in a surprisingly uniform sequence are to be seen along the north slope of the Sleeping Giant at Sawyer Bay.

The forests of the whole region have been lumbered and burned over, although in a few places were found small areas of apparently primeval growth. Near Fort William are the northern limits of the hard maple and American elm and through the whole region the forests are quite uniform and consist of but few species. On the sand and gravel terraces the Banksian pine rules, in the bogs and poorly drained lake borders the tamarack and black spruce; on poorly drained flats over clay or other impervious soil the black spruce occurs practically pure; in wet, but well-drained places, as at the outlet of a small lake where a swift running stream keeps the water in motion, the arbor vitae prevails, as it does also on rocky

slopes where the underground water is in motion; the climax forest on more mesophytic habitats, as has just been pointed out in the last number of the Botanical Gazette (1) is the association dominated by the balsam, birch, and white spruce; the burned over areas soon pass through an aspen and birch forest; while into the lichen heath on top of the rounded rocky hills comes first the black spruce and often a close second the Banksian pine.

The following annotated list of the pteridophytes collected during the trip it is hoped will be of sufficient interest to justify its publication, although the writer did not specialize to any extent upon the ferns while in the field. Out of about twenty-seven hundred field numbers it develops that two hundred represent ferns and fern allies; and, that all the species that occur in the region were not found, is evident upon comparison with Macoun's Catalogue (2) and with Klugh's Fern-Flora of Ontario (3). Thankful acknowledgment is hereby made for the determination of the specimens by Prof. L. S. Hopkins, the Curator of the Fern Society Herbarium.

LYCOPODIALES

1. LYCOPODIUM SELAGO L.

On Huronian slate, Jackfish Island, Jackfish, July 19, 1912.

2. LYCOPODIUM LUCIDULUM Michx.

In moist woods in deep valley near Ruby Lake, 4 miles south of Nepigon, August 25, 1912, and in dark, narrow defile between cliffs on east side of Nepigon River, with Prof. J. A. Underhill, of the Fort William Schools, August 26, 1912. This is apparently a rare species along the "North Shore."

3. LYCOPODIUM POROPHYLLUM Lloyd and Underw.

Margin of little pond at west side of Surprise Lake, Silver Islet Harbor, August 17, 1912.

4. *LYCOPODIUM ANNOTINUM* L.

In mesophytic or sometimes more xerophytic situations in woods: Ft. William; Silver Islet Harbor; Nepigon; Jackfish; Rossport.

4a. *LYCOPODIUM ANNOTINUM* var. *PUNGENS* Desv.

In dense black spruce-sphagnum bog, Pay's Plat, July 15, 1912; and in black spruce-sphagnum bog one mile west of Heron Bay Station, July 20, 1912.

5. *LYCOPODIUM CLAVATUM* L.

On rocky shore of Loch Lomond, Fort William, and in thin, black spruce woods on top of rocky hills at Nepigon and Heron Bay.

6. *LYCOPODIUM OBSCURUM* var. *DENDROIDEUM* (Michx.)

D. C. Eaton.

Common in more or less xerophytic woods: Top of Mt. McKay, among birches, Ft. William; talus slope at base of Sleeping Giant, Thunder Cape; rather dry woods at top of hills below Nepigon; on granite bluffs on east side of Nepigon River ten miles above town, and at Alexander Portage, seven miles farther north; on bare, rocky hills back of Rossport.

7. *LYCOPODIUM COMPLANATUM* L.

Dry woods on low ridges, Silver Islet Harbor; top of cliffs along Nepigon River, south of town.

7a. *LYCOPODIUM COMPLANATUM* forma *WIBBEI* Haberer.

In aspen-birch woods at base of slate cliff two miles southwest of Silver Islet Harbor, August 4, 1912.

8. *SELAGINELLA RUPESTRIS* (L.) Spring.

On rounded, granite rocks along Lake shore, Rossport; on face of mica-schist cliff back of Heron Bay Station; on rocky shore of little lake on hills south of Nepigon.

EQUISETALES

9. *EQUISETUM ARVENSE* L.

Sandy flat along lake shore, Rossport; sandy shore of Nepigon River, below town.

9a. *EQUISETUM ARVENSE* var. *CAMPESTRE* Schultz.

On gravelly island at lower end of rapids, Nepigon.

10. *EQUISETUM SYLVATICUM* L.

Common in various habitats ranging from dense, black spruce-sphagnum bog (Pay's Plat) to moist soil in mesophytic woods and sandy flats along lake shore; Ft. William; in swamp meadow at delta of Nepigon, where it empties into Lake Helen; Pay's Plat; Jackfish; Heron Bay Station.

11. *EQUISETUM LITORALE* Kuhl.

Sandy flat along shore of Thunder Bay, Ft. William; along roadside ditch at base of Mt. McKay, Ft. William.

12. *EQUISETUM FLUVIATILE* L.

In pools in bog at Mission and on sandy and often submerged flats along the shore of Thunder Bay, Ft. William; forming a dense vegetation in shallow water and around margins of shores and islands Nepigon River, below town; margin of Lake Jessie, twenty miles north of Nepigon.

13. *EQUISETUM LAEVIGATUM* A. Br.

Along boggy bank of Nepigon River, below town, June 30, 1912.

OPHIOGLOSSALES

14. *BOTRYCHIUM LUNARIA* L.

In sandy soil on sloping grassy shore of Boone Island, near Rossport, and sloping, sandy pasture along lake

shore, south of Rosspport; in grassy spot at base of granite knob which projects up out of a bog about two miles west of Heron Bay Station.

After the first experience with *Botrychium Lunaria* in the field the clannishness of the *Botrychia*, as Prof. Hopkins has pointed out (4), was quickly realized and a little observation led to the conclusion that, given an open, rather well-drained, sandy spot with *Botrychium Virginianum* and *Habenaria hyperborea* present, the conditions were excellent for the discovery of *B. lunaria*. Later experience showed that these conditions did not always prove the occurrence of *B. lunaria*, but *B. lunaria* was not found in any case without these precise conditions.

15. *BOTRYCHIUM TERNATUM* var. *RUTAEFOLIUM* (A. Br.)
D. C. Eaton.

In low, grassy pasture near Marie Louise Lake, August 20, 1912. This station apparently constitutes a considerable extension of range to the northwestward for the plant. Gray's Manual says: "Nfd. to s. N. H. and n. Mich.", while North American Flora notes: "Nova Scotia and Quebec to Vermont and Wisconsin."

16. *BOTRYCHIUM VIRGINIANUM* L.

Common in moist, rich, mesophytic forests: Ft. William; Silver Islet Harbor; Nepigon; Rosspport; Heron Bay Station.

16a. *BOTRYCHIUM VIRGINIANUM* var. *GRACILE* (Pursh)
D. C. Eaton.

In primeval arbor-vitae bog, one mile north of Marie Louise Lake, Thunder Bay Peninsula, August 15, 1912.

FILICALES

17. *OSMUNDA CLAYTONIANA* L.

Moist, rich, but not too boggy, soil: Ft. William; Rossport; Heron Bay Station.

18. *POLYPODIUM VULGARE* L.

Common on cliffs and on talus-slopes: Mt. McKay, Ft. William; on bare, rounded rocks at top of Sleeping Giant, 1,800 ft. alt., Thunder Cape; Nepigon; on spray-washed rocks along lake at Rossport.

19. *PHEGOPTERIS PHEGOPTERIS* (L.) Underw.

At base of cliffs in deep woods, Silver Islet Harbor; on rocks at mouth of Nepigon River.

20. *PHEGOPTERIS DRYOPTERIS* (L.) Fée.

Common on rocks and cliffs: Ft. William; Silver Islet Harbor; Nepigon; Rossport; Heron Bay.

21. *PHEGOPTERIS ROBERTIANA* (Hoffm.) A. Br.

On talus slope consisting of a reddish sandstone (Keweenawan), one-half mile southeast of "Grassy Lake," Silver Islet Harbor, Thunder Bay Peninsula, August 4, 1912. Klugh notes that for Ontario this species is "Reported only from Lac Seul, Rainy River district, by R. Bell."

22. *PTERIDIUM AQUILINUM* (L.) Kuhn.

Abundant in localities, usually on sandy terraces, in open spots: Ft. William; Sawyers Bay, Thunder Cape; Nepigon.

22a. *PTERIDIUM AQUILINUM* var. *PUBESCENS* Underw.

In rather dry spruce-birch-aspen woods, west of Silver Islet Harbor, Thunder Bay Peninsula, June 23, 1912.

23. *CRYPTOGRAMMA STELLERI* (Gmel.) Prantl.

Various localities on shaded cliffs: Nepigon; Heron Bay Station; Silver Islet Harbor; and on the brink of Kakabeka Falls.

24. *ATHYRIUM FILIX-FOEMINA* (L.) Bernh.

Common in moist woods: Ft. William; Silver Islet Harbor; Nepigon; Alexander Portage; Rossport; Jackfish; Heron Bay Station.

25. *DRYOPTERIS THELYPTERIS* (L.) A. Gray.

One collection only: edge of bog at base of Mt. McKay, Ft. William, July 30, 1912.

26. *DRYOPTERIS FRAGRANS* (L.) Schott.

Pre-eminently characteristic of otherwise almost barren, talus slopes: Mt. McKay, Ft. William; Sleeping Giant, Thunder Cape; Nepigon; Jackfish; Heron Bay; Macoun noted a number of other localities and remarked concerning its abundance around Lake Nepigon.

27. *DRYOPTERIS SPINULOSA* (Muell.) Ktze.

Common in mesophytic woods: Ft. William; Thunder Bay Peninsula; Nepigon; Alexander Portage; Rossport; Heron Bay Station.

27a. *DRYOPTERIS SPINULOSA* var. *INTERMEDIA* (Muhl.)

Underw.

In rich, well-drained woods, Thunder Cape, June 23, 1912; rich, moist woods south of Crystal Lake, four miles south of Ft. William.

27b. *DRYOPTERIS SPINULOSA* var. *DILATATA* (Hoffm.)

Underw.

Rather common in moist, but well-drained, mesophytic woods: Ft. William; Thunder Bay Peninsula; Nepigon; Jackfish; Heron Bay Station.

28. *FILIX BULBIFERA* (L.) Underw.

One collection only: Silver Islet Harbor, Thunder Cape, August 15, 1912. On moss-covered crumbling rock in arbor-vitae swamp.

29. *FILIX FRAGILIS* (L.) Underw.

On rocks and cliffs in shady places, often with *Cryptogramma stelleri*: Ft. William; Silver Islet Harbor; Nepigon; Heron Bay Station.

30. *FILIX FRAGILIS* var. *MAGNA-SORA* Clute.

Along sandstone, talus slope, one and one-half miles west of Silver Islet Harbor, Thunder Cape, August 4, 1912.

31. *WOODSIA ILVENSIS* (L.) R. Br.

In niches of rocks and cliffs: Mt. McKay, Ft. William; Silver Islet Harbor; Nepigon; RosSPORT.

32. *WOODSIA ALPINA* (Bolt.) S. F. Gray.

Along coastal cliffs at Fork Bay and sandstone ledges around Surprise Lake, both near Silver Islet Harbor; on rocky, shaded ledge at "Beaver Lake," near the western end of St. Ignace Island.

33. *WOODSIA GLABELLA* R. Br.

On shaded precipice (columnar trap), east side of Nepigon River, two miles below town; on mica-schist cliff, east of Heron Bay Station and on sea-cliff at Heron Bay. Macoun records it from the Kaministiquia River, west of Ft. William and from the Nepigon River.

34. *ONOCLEA SENSIBILIS* L.

Seen and collected but once: near the maple sugar grove, in the hills four miles south of Ft. William, O. E. and Mrs. O. E. Jennings and Prof. J. A. Underhill, of the Ft. William schools, July 30, 1912.

35. MATTEUCCIA STRUTHIOPTERIS (L.) Todaro.

In moist, rich soil: Ft. William; Kakabeka Falls; Nepigon. Not noted at any stations east of Nepigon.

The absence in the collections of a number of ferns which had been expected to occur in the region covered is rather noticeable. No specimens of *Adiantum* or true *Asplenium* were seen, nor did *Polystichum Lonchitis* appear, although the writer would certainly have noticed and collected them had they been discovered.

LITERATURE CITED

(1). Cooper, William S. "The Climax Forest of Isle Royal, Lake Superior, and Its Development," I, Bot. Gaz., 55: 1-44. Jan. 1913.

(2). Macoun, John. Catalogue of Canadian Plants, Part V. Acrogens. Geol. and Nat. Hist. Surv. of Canada. 1890.

(3). Klugh, A. B. "The Fern-Flora of Ontario." Fern Bull., 14: 65-74. July, 1906.

(4). Hopkins, L. S. "Notes on the *Botrychia*." Amer. Fern Jour., I: 3-6. Aug., 1910.

Carnegie Museum, Feb. 8, 1913.

Addenda to Prof. Jennings' Article

The following notes have, at the request of the writer, been contributed by Prof. L. S. Hopkins. The references are to the species indicated in a similar manner in the text of the article.

a. EQUISETUM LITTORALE Kuhl.

Although the fruit of this species is usually abortive, a few of these plants produced spores, which, contrary to the usual custom, bore elaters.

- b. *BOTRYCHIUM TERNATUM* var. *RUTAEFOLIUM* (A. Br.)
D. C. Eaton.

These plants are much smaller than any hitherto recorded. The height of the smallest plant is 6.5 cm., while its sterile segment is only 4 cm. long by 2.5 cm. wide. The sterile segment of the previous year, which is still attached to the plant, is only 1.2 cm. wide.

- c. *PHEGOPTERIS ROBERTIANA*. (Hoffm.) A. Br.

This is a new station for this rare fern. Although growing on sandstone and somewhat smaller than other plants, the presence of stalked glands on the stipe and rachis show it to be *P. Robertiana*.

- d. *DRYOPTERIS SPINULOSA* var. *DILATATA* (Hoffm.)
Underw.

Nos. 1212 and 1731 have smooth indusia. According to the new Gray's Manual this would therefore be: *Aspidium spinulosum* (O. F. Mueller) Sw. var. *dilatatum* (Hoff.) Hook. forma *anadenium* Robinson. In the writer's opinion a much better designation would be ***Dryopteris dilatata*** (Hoff.) Gray, forma ***anadenia*** comb. nov.

- e. *FILIX BULBIFERA* (L.) Underw.

This is probably the farthest northwest station for this fern. It is rather remarkable that a rock-loving fern should have been found in an arbor-vitae swamp. The fronds vary somewhat, but it is typical *bulbifera* as found in Ohio and other limestone regions, where it is to be found in abundance.

L. S. HOPKINS.

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